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# Accelerating Clinical Integration of Imaging AI: Open-Source Deployment with MONAI Deploy Express

Bryan Luna, Cincinnati Children's Hospital Medical Center; Will Tepe; Ming Qin, MSc; Victor Chang; Barbaros S. Erdal, PhD; Vikash Gupta, PhD; Khaled Younis, PhD; Elanchezhian Somasundaram, PhD

## Introduction/Background

The rapid advancement of artificial intelligence (AI) models in medical imaging has outpaced their clinical integration, highlighting a critical gap between research and deployment. Existing commercial AI deployment platforms are often proprietary and inflexible, limiting their utility during early-stage deployment. This work aims to address this gap by utilizing an open-source deployment platform for medical imaging AI applications.

## Methods/Intervention

We utilized MONAI Deploy Express (MDE), a component of the MONAI Deploy framework, as a comprehensive environment for validating and testing containerized MONAI Application Packages (MAPs). MDE provides a standardized, easy-to-use framework to deploy MAPs. The platform employs essential services including the Informatics Gateway, Workflow Manager, and Task Manager to enable seamless orchestration of multiple AI models with clinical systems. At our institution, a tailored MDE instance was deployed on a single NVIDIA DGX A100 GPU server to support three distinct clinical workflows with varying levels of automation and integration with clinical systems.

## Results/Outcome

Three clinical workflows were implemented between April and July 2025. The first was a fully automated pipeline, where Compass Routing Workflow Manager directed selected DICOM studies to MDE for processing by Hand Radiograph Bone Age Prediction, CT Liver Spleen Segmentation, or MRI Liver Spleen Segmentation models. Outputs were exported as DICOM objects back to Supplemental PACS or the dictation system for radiologist review. The second workflow supported clinical research, automatically routing CT abdominal studies to MONAI's CT whole-body segmentation application for dosimetry analysis, with results integrated into a research DICOM server and organ volume registry. The third workflow was manually triggered for cardiology workflows, where clinicians uploaded CT chest studies to a customized ORTHANC instance for processing by a Total Cardiac Volume prediction model. Results were returned to the clinician's workstation through the same ORTHANC instance. These workflows demonstrated the flexibility, scalability, and clinical readiness of the MDE platform.

## Conclusion

MONAI Deploy Express offers a robust and flexible framework for integrating home-grown and open-source medical imaging AI applications into clinical workflows.

## Statement of Impact

MDE's modular architecture and standardized deployment tools enable seamless coordination with existing clinical systems, supporting the translation of custom AI solutions from research environments into routine clinical practice.


Figure 1: MONAI Deploy overview. Trained medical imaging AI models are packaged into MAPs, which can then be deployed using MONAI Deploy Express (including the Informatics Gateway, Workflow Manager, and Task Manager) to integrate with clinical systems (MONAI Consortium: MONAI Deploy. https://monai.io/deploy.html. Accessed July 23, 2025.)

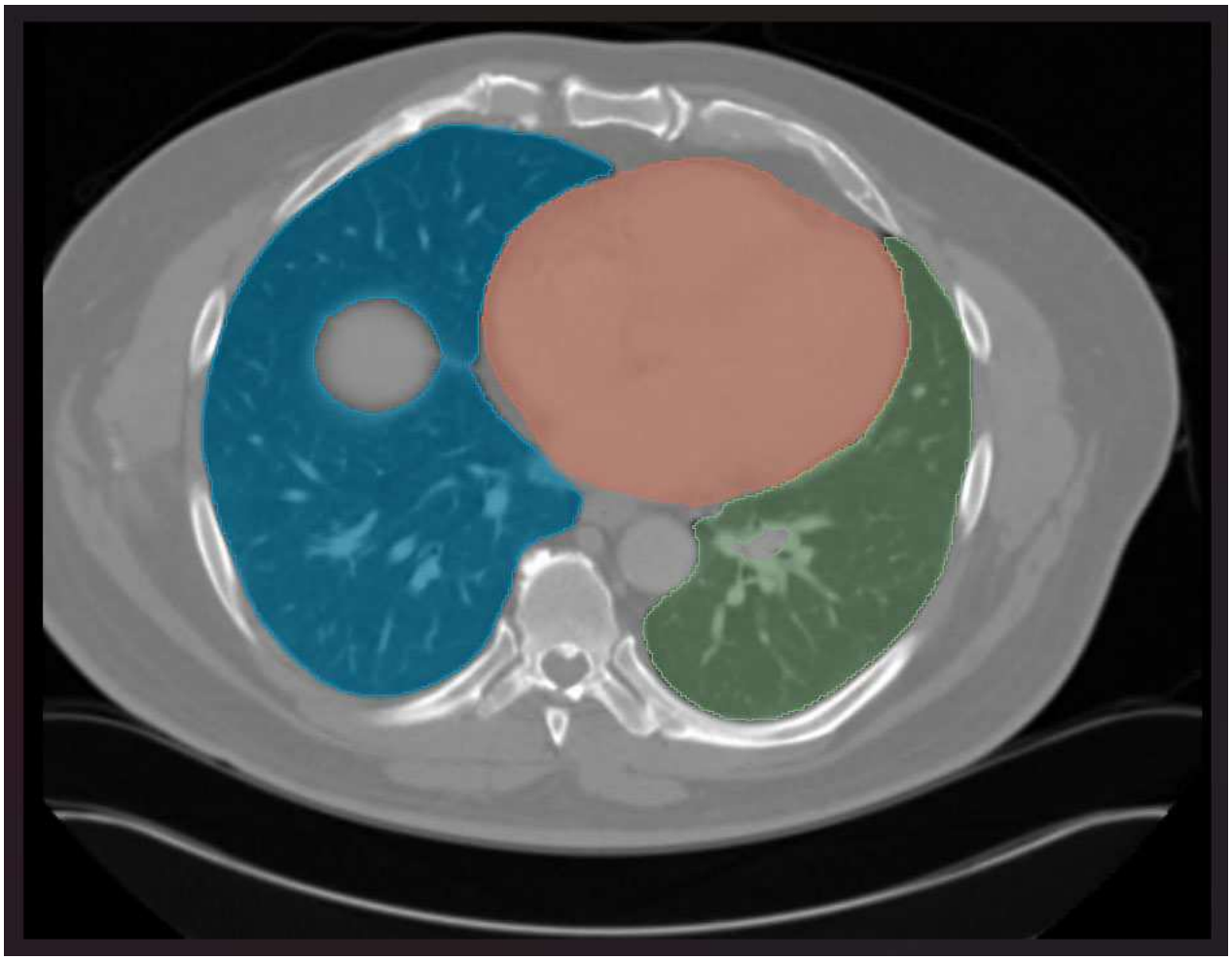

Figure 2: DICOM SEG produced by the Total Cardiac Volume prediction model loaded in 3D Slicer, overlaid on the source DICOM series used for inference. The heart and lungs are segmented.

**Manufacturer:** The MONAI Consortium (MONAI Deploy App SDK)
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# Diagnostic Imaging Report

**Narrative Summary:**
Heart Volume: 496 mL
Left Lung Volume: 560 mL
Right Lung Volume: 555 mL

Figure 3: DICOM SR produced by the Total Cardiac Volume prediction model. Heart and lung organ volumes are calculated by the model and integrated into the report.

**Keywords**
Medical Imaging; AI Models; Deployment; Interoperability; MONAI